EXECUTIVE SUMMARY

The Connecticut Department of Transportation (ConnDOT), and the Council of Governments of Central Naugatuck Valley (COGCNV) have identified peak hour traffic congestion and safety deficiencies along Interstate 84 (I-84) as major concerns for the West of Waterbury (WOW) corridor between the Housatonic River in Southbury and Interchange 23 in Waterbury. To address these concerns and to evaluate the effectiveness of different transportation improvement alternatives, these agencies are jointly undertaking a Needs and Deficiencies Study for the WOW corridor.

The mobility and economic vitality of the corridor is of critical importance to its communities, the Central Naugatuck Valley Region (CNVR), and the state as a whole. In addition, because the corridor includes I-84, all of New England will be impacted by the proposed transportation improvements. The ability to continue to move safely and efficiently through the corridor will influence the competitive position of businesses in the region.

This report identifies the existing and future needs and deficiencies in the WOW corridor and recommends modifications that will best meet the needs of the towns, the region, and the state. The recommendations were chosen from a set of alternatives developed as a result of input from the citizens and representatives of the study area communities. The suggested alternatives were evaluated on their ability to satisfy the study goals and objectives and to accommodate future mobility and land use projections. The selected improvements were identified by their overall effectiveness in contributing to safety, reducing congestion, and improving air quality and by their economic feasibility.

Study Area Definition

The study corridor limits can be described as: I-84 from the Housatonic River (Interchange 13) in Southbury to Interchange 23 in Waterbury, including the interchange of Route 8 and its associated ramps, the Oxford Airport, the intersection of Routes 63 and 64, and approximately 2000 feet of land on both the north and south sides of the Interstate. The physical transportation improvement recommended by this study focused on approximately 13 miles of this corridor from Interchange 18 in Waterbury to the Housatonic River.

Transportation Goals and Objectives

Transportation Goals and Objectives are the cornerstones for evaluating alternative transportation improvements. To evaluate the potential for success of these alternatives, an Advisory Committee (AC) was asked to define the goals and objectives for the study. The following four goals are supported by a comprehensive set of specific objectives and related performance measures:

- **Reduce Peak Hour Congestion -** The first goal is to reduce peak hour vehicular congestion, both in the A.M. and P.M. periods.

- **Public Health and Safety -** The second goal is to improve public health and safety associated with transportation.

- **Economic Development -** The third goal is to increase opportunities for local and region-wide economic development by improving transportation mobility.

- **Community Livability and Quality of Life -** The fourth goal is to enhance the livability and quality of life for corridor towns, neighborhoods and communities

Land Use

Land use is the force that drives the increase or decrease in traffic within a region. As land that is zoned commercial or industrial is developed, jobs and services are created that attract people. Residential properties are created in areas that allow those people to access their jobs, and population densities are created and moved as the economy dictates. With this dynamic demographic environment comes change in transportation, both in magnitude and orientation. Areas that are in stages of growth also see growth in traffic, while areas that experience losses in population and employment typically have reductions in traffic. The specific areas in which towns zone their developable land also plays an important role in traffic congestion. The trend toward suburban sprawl increases the average trip length and contributes to the utilization of roads that were not necessarily designed to accommodate high levels of traffic. With this in mind, towns and cities must plan carefully in order to best utilize the existing transportation infrastructure.

While various communities within the study corridor are forecasted to grow at differing rates, the underlying premise is that the region will experience modest growth over the next 25 years. This will mean growth in traffic that will need to use the existing transportation infrastructure, much of which is currently experiencing high levels of traffic.

Other Modes of Transportation

The WOW Study is mainly focused on the operations and performance of the interstate and its associated interchanges, with a primary goal to define opportunities that would reduce vehicular congestion. This does not explicitly imply that capacity must be added to the interstate to accommodate the growth in traffic. While this is certainly a potential transportation alternative, it must be supported by investments in other modes of transportation to provide a long term and user- friendly solution to the sustained mobility of the region. For this reason, several other modes of transportation were identified and inventoried to gain a perspective on their scope and effectiveness. They were as follows:

- Public Transit (bus and rail);
- Oxford Airport;
- Goods Movement (trucks);
- Pedestrian Facilities; and
- Bicyclist Facilities.

Environmental and Social Factors

The development patterns within the WOW corridor vary between densely developed urban and developed rural. This development has displaced much of the natural environment of the sub-region; however, that which remains is important to sustain the ecological and human quality of life. As a first step, from available sources of information, these natural resources have been identified and mapped. As improvement alternatives are refined, additional data will be gathered and potential impacts quantified.

Environmental resources, such as farmlands: environmental risk sites, wetlands, important fisheries and wildlife habitat, rare and endangered species, watercourses, wells, and aquifers, floodplains, public water supplies and surface water, public 4(f) and 6(f) lands, and air and noise impacts, were identified from secondary source data.

Cultural resources are an important part of Connecticut's heritage and cultural fabric. Significant historic and archaeological resources receive protection under Section 106 of the National Historic Preservation Act and Section 4(f) of the U.S. Department of Transportation Act.

Social factors and cultural resources, including historic sites, archeological sites, commercially important natural resources, visual/aesthetic resources, business activity and major employers, park-lands, management area and campgrounds, and museums and cultural resources were identified as part of this study.

"Environmental Justice" requires that no federally funded project should be implemented in such a way as to result in disproportionately high and adverse effects on disadvantaged, minority, and/or low-income populations. The 1990 U.S. Census data were reviewed as the primary means of evaluating potential environmental justice issues in the Study Area. With the exception of Waterbury, the communities within the Study Area have a lower percentage of low income and minority populations than the CNV Region overall and the State of Connecticut in general.

The recommended improvements have been conceptualized to avoid and/or minimize negative affects upon environmental resources, social and cultural factors, and populations considered under "Environmental Justice".

Study Purpose and Need

The mobility and economic vitality of the WOW Corridor is of critical importance to its communities, the CNV Region, and the state as a whole. In addition, because the corridor includes I-84, all of New England will be affected by the proposed transportation improvements. The ability to continue to move safely and efficiently through the corridor will influence the competitive position of businesses in the region.

The transportation improvements considered must respond to a variety of regional and local needs, including:

- Peak hour congestion of I-84 and parallel arterial roads;

- I-84 highway connectivity;
- Highway safety and directional signage;
- Assessing the future of the I-84/Route 8 viaduct; and,
- Public transit's role in the region.

In addition to these issues, other equally pressing matters are faced by municipalities and localized communities. For example, economic redevelopment initiatives in Waterbury, or highway spillover traffic on local town roads are important issues for local decision makers.

This Deficiencies and Needs Study for the I-84 corridor has been undertaken by the ConnDOT and COGCNV to define improvements that would address peak period traffic congestion and safety deficiencies along I-84 between Downtown Waterbury and the Housatonic River in Southbury.

Transportation Strategies

The identification and screening of potential alternative transportation improvements was performed in the Needs and Deficiencies process. The range of transportation improvements that were considered in this evaluation are listed below. They include No Build, Transportation Systems Management, Transportation Demand Management, Transit Operations, Intelligent Transportation Systems, Freeway Operations and Reconstruction Without Additional Capacity, and Freeway Reconstruction With Additional Capacity.

- No Build (Existing and Committed)

  The first strategy category is the No Build alternative. This Maintenance and Preservation Level of Improvement (LOI) would consider the implementation of improvements currently programmed and would contemplate no further increases to transport system capacity. The strategy assumes that facilities will be maintained effectively and safety improvements made where necessary.

- Transportation Systems Management

  Transportation System Management (TSM) is a name given to a broad range of strategy types whose purpose is to get the most out of existing transportation infrastructure without major capital investment. The performance of TSM related strategies is typically measured in terms of the movement of people and goods. TSM strategies are closely related to Transportation Demand Management (TDM) and Transit Operations (Bus Operations). A complementary package of TSM, TDM, and Bus Operations provides the potential for the most efficient system operation.

- Transportation Demand Management

  Transportation Demand Management (TDM) is a generic term that encompasses a wide range of strategies that have been employed by jurisdictions across the U.S. to reduce peak hour vehicular travel and increase overall mobility. There is a compelling relationship

between land use and transportation. The form and relationship among land uses dictates the type and level of travel demand generated. Travel demand is further influenced by the availability of alternative modes, travel time, and cost of trip - fare, parking, and other vehicle costs. The purpose of TDM strategies is to control these factors in a manner that direct travel demand to more efficient and productive modes.

- Transit Operations Service

  Bus system improvements could improve the ability of bus systems in the study corridor to attract riders and meet mobility needs. For example, an express service running the length of the WOW corridor and beyond that would serve local commuters.

- Freeway Operations/Intelligent Transportation Systems

  Intelligent Transportation Systems (ITS) means the application of modern information management processing, and communication technology to transportation systems. It includes a wide range of techniques capable of improving many different aspects of traffic and transportation systems

- Interchange Improvements

  The expressed purpose of these improvements is to increase the safety and useful life of current facilities, while improving the operation of traffic. This category of improvements included:

  - Improvement in roadway geometrics - horizontal and vertical curve;
  - Reconstruction of bridges and drainage structures;
  - Substitution of right-hand for left-hand ramps; and
  - Completion of interchanges from partial to full movements.

- Additional Capacity on Interstate 84

  This strategy evaluated the addition of a highway lane(s) for general-purpose traffic on I-84. Reconstruction of the facility would include the correction of ramps, completion of interchanges, reconstruction (and widening) of bridges, and modification of substandard geometrics.

Evaluation and Screening of Transportation Alternatives

Each of the conceptual alternatives identified in the study were evaluated based on their ability to address the deficiencies in the transportation system while avoiding or having minimal impact to environmental and social constraints.

The initial screening process used the stated Goals and Objectives as defined by the Advisory Committee as criteria to be evaluated against. Performance measures were used to quantify the transportation benefits, while environmental and social impacts were qualitatively identified

based on constraints mapping. From this process, a series of conceptual transportation improvements was developed to address each of the identified corridor deficiencies, and public comment was used to shape the alternatives into solutions that best served the needs of the communities.

The second phase of screening involved revising many of the conceptual improvement alternatives to consider physical geometry, construction constraints, cost estimates, property impacts, and additional environmental concerns. The suggested modifications that resulted, while still conceptual in nature, constitute the recommendations provided in this report.

Recommended Actions

The principle transportation improvement recommendation to result from this study process is the addition of a General Purpose Lane on I-84 in each direction with intermittent truck climbing lanes, from Interchange 13 to Interchange 18. This is approximately 13-miles of I-84 that today primarily has two travel lanes in each direction with intermittent truck climbing lanes. The cost for the construction of additional lanes on I-84 is approximately $267,600,000.

Additional improvements are also recommended at each interchange area west of, and including, Interchange 18 to address various deficiencies in the transportation system. These improvements consist of Transportation Systems and Demand Strategies as well as safety improvements to the corridor. The cost for the interchange improvements is approximately $15,000,000. Finally, the need for improvements for the I-84/Route 8 Interchange area in Waterbury has been identified, but need to be quantified by a future study.

Each of the recommended improvements has in the following text been tabulated by interchange area. Recommended improvements identified as short-term are projects that may be advanced within a schedule which is ahead of the long-term projects.

Interchange 13

Interchange 13 in Southbury is the westernmost interchange within the WOW study corridor. It forms a partial interchange just east of the Housatonic River, serving trips to and from the west. This interchange has two mainline lanes along I-84 in the eastbound and westbound directions. The on and off ramps to and from I-84 are single lane ramps. The short-term and long-term recommendations at this interchange area are listed in Table ES-1.

Table ES-1
Summary of Interchange 13 Recommendations

Project	Type	Preliminary Cost Estimate	Comments
Short-Term			
➢ Increase corner radius at WB entrance ramp and Oakdale Manor Road to 50 feet to accommodate trucks	TSM - Intersection	N/A	This deficiency will be addressed by DOT Safety Improvement Project No. 130-169
➢ Construct a new park and ride lot in interchange area	TDM - Parking	$320,000	
➢ Install a new sign for I-84 WB entrance ramp on Oakdale Manor Road	TSM - Signage	$2,500	
➢ Replace the faded route marker on Fish Rock Road	TSM - Signage	$500	Notify ConnDOT Maintenance
Long-Term			
➢ Provide 1400 feet of acceleration length for I-84 WB entrance ramp	Interstate Ramp	N/A	Will be completed as part of Interstate reconstruction
➢ Provide 500 feet of deceleration length for I-84 EB exit ramp	Interstate Ramp	N/A	Will be completed as part of Interstate reconstruction
➢ Provide an additional General Purpose Lane along I-84 EB	Interstate Mainline	N/A	Costs are broken out by contract (see Table 5.9)
➢ Provide Additional General Purpose Lane along I-84 WB	Interstate Mainline	N/A	Costs are broken out by contract (see Table 5.9)

NA – Not Applicable – will be completed by ConnDOT

The short-term recommendation for this interchange involves improving the corner radius of the westbound entrance ramp at Oakdale Manor Road. Increasing to a standard 50-foot radius will improve safety. This improvement has already been advanced by ConnDOT and will be constructed as part of their safety improvement program. This recommendation also has the potential for inclusion of a commuter parking facility and the improvement of signage in the area.

As a long-term solution, I-84 in the vicinity of this interchange requires an additional general-purpose lane in each direction to accommodate future year (2025) traffic volumes. In addition, adequate acceleration and deceleration distances need to be provided during the freeway reconstruction phase in coordination with the additional general-purpose lane.

Interchange 14

Interchange 14 in Southbury has full directional access to and from Route 172. This interchange has two mainline lanes and single lane entrance and exit ramps along I-84 in the eastbound and westbound directions. In the future year 2025, the eastbound entrance and exit ramp junctions with I-84 operate at LOS F during the weekday evening peak hour. The westbound entrance and exit ramp junctions with I-84 operate at LOS F during the weekday morning peak hours. During the weekday evening peak hour, the South Britain Road and I-84 westbound exit ramp junction operates at LOS F. It has been determined that the lack of storage space between the westbound off ramp and Main Street South along with the heavy right hand turn movement at this

intersection creates a queuing problem on this ramp. The short-term and long-term recommendations at this interchange area are listed in Table ES-2.

Table ES-2
Summary of Interchange 14 Recommendations

Project	Type	Preliminary Cost Estimate	Comments
Short-Term			
➢ Signalize the intersection with I-84 WB exit ramp and S. Britain Road to relieve queuing on ramp. ➢ Provide signal coordination and adequate lane geometry to improve traffic operations at intersection of S. Britain Road and Main Street South	TSM - Intersection	$550,000	
➢ Provide additional acceleration length for I-84 EB and WB entrance ramps	Interstate Ramp	N/A	This deficiency will be addressed by DOT Safety Improvement Project No. 130-169
➢ Eliminate the all-way STOP sign control at the intersection of Lakeside Road/Georges Hill Road/I-84 EB Off Ramp and provide a traffic signal	TSM - Intersection	$490,000	Intersection will require additional time between phases to clear vehicles
➢ Install a new I-84 directional sign on Main Street South	TSM - Signage	$500	
➢ Replace the damaged directional sign on I-84 WB exit ramp	TSM - Signage	$500	Notify ConnDOT Maintenance
Long-Term			
➢ Provide 600 feet of deceleration length for I-84 EB exit ramp	Interstate Ramp	N/A	Will be completed as part of Interstate reconstruction
➢ Provide additional General Purpose Lane along I-84 EB	Interstate Mainline	N/A	Costs are broken out by contract (see Table 5.9)
➢ Provide additional General Purpose Lane along I-84 WB	Interstate Mainline	N/A	Costs are broken out by contract (see Table 5.9)

NA – Not Applicable – will be completed by ConnDOT

To improve traffic operations, the intersection of Main Street South and South Britain Road requires widening and signal coordination with the South Britain Road and I-84 Westbound Off-Ramp intersection. Constraints at the intersection include a gas line that runs south of the intersection and parallel to Main Street South. There is also a commuter parking lot in the southeast quadrant of the intersection. In the northwest quadrant of the intersection, there are residential properties that should be considered prior to widening the intersection.

The intersection of Lakeside Road, Georges Hill Road, and the I-84 Eastbound Ramp is recommended to be signalized and widened to improve traffic operations. Widening on the east side of the intersection is constrained by rock ledge so widening may need to be performed on the west side of the intersection.

As a long-term solution, I-84 in the vicinity of this interchange requires an additional general-purpose lane in each direction to accommodate future year (2025) traffic volumes. ConnDOT is currently pursuing a Safety Improvement Project (No. 130-169) to improve acceleration

distances at this interchange. The deceleration distance along I-84 EB will be addressed during the freeway reconstruction phase of the project (long-term solution).

Other recommendations at this location involve improving highway and roadway signage (TSM).

Interchange 15

Interchange 15 is the primary access to the Town of Southbury. It provides full directional access to and from Route 6. Major commercial development in this area makes it the most heavily utilized interchange in Southbury. The configuration consists of two mainline lanes and single lane entrance and exit ramps along I-84 in the eastbound and westbound directions; however, in the westbound direction due to the presence of a climbing lane, there are three mainline lanes along I-84 just west of the on ramp from Route 6/Route 67 and the IBM driveway. In the future year 2025, the eastbound entrance and exit ramps from Route 67 operate at LOS F during the weekday evening peak hour, while the westbound entrance and exit ramps operate at LOS F during the weekday morning peak hour. The short-term and long-term recommendations at this interchange area are listed in Table ES-3.

Table ES-3
Summary of Interchange 15 Recommendations

Project	Type	Preliminary Cost Estimate	Comments
Short-Term			
➢ Provide additional turn lanes to improve traffic operations at intersection of Route 6/Main Street South/Southbury Plaza Driveway	TSM - Intersection	$150,000	
➢ Extend the EB truck climbing lane through the interchange to eliminate difficult weave	Interstate Mainline / Safety		Will involve expanding the I-84 structure over S. Britain Road
➢ Improve visibility of I-84 directional sign	TSM - Signage	N/A	Notify ConnDOT Maintenance
➢ Provide adequate signage along Route 6/67 to alert drivers in advance of the I-84 EB and WB On-Ramps	TSM - Signage	$2,000	
Long-Term			
➢ Provide 900 feet of acceleration length along I-84 EB entrance ramp	Interstate Ramp	N/A	Will be completed as part of Interstate reconstruction
➢ Provide additional 400 feet deceleration length to I-84 WB exit ramp to account for vehicle queue on ramp	Interstate Ramp	N/A	Will be completed as part of Interstate reconstruction
➢ Provide additional General Purpose Lane along I-84 EB	Interstate Mainline	N/A	Costs are broken out by contract (see Table 5.9)
➢ Provide additional General Purpose Lane along I-84 WB	Interstate Mainline	N/A	Costs are broken out by contract (see Table 5.9)

NA – Not Applicable – will be completed by ConnDOT

The intersection of Main Street, Route 6/67 and Southbury Plaza is recommended to be widened to provide an additional left turn lane in the northbound direction along Main Street. Due to this widening, Main Street would need to be widened in the westbound direction to provide adequate width for left turning vehicles. Also, the northbound right turn lane on Main Street would be shifted east of its present location due to the additional left turn lane. Based on field surveys, it appears feasible to provide the additional widening on the east side without impacting the parking lot in Southbury Plaza.

As a long-term solution, this interchange requires an additional general-purpose lane in each direction to accommodate future year (2025) traffic volumes. In addition, adequate acceleration and deceleration distances will be provided along I-84 in the eastbound and westbound directions during the freeway reconstruction phase of the project.

The extension of the existing truck climbing lane through the interchange area and improving highway signage will also be looked at as a short-term solution.

Interchange 16

Interchange 16 provides full directional access to and from Route 188 in Southbury. While these ramps are important to development in Southbury, they also serve development in Middlebury and Oxford. Interchange 16 also provides an important linkage to Oxford Airport. This interchange has two mainline lanes and single lane entrance and exit ramps along I-84 in the eastbound and westbound directions. In the future year 2025, the eastbound entrance and exit ramps from Route 188 operate at LOS F during the weekday evening peak hour, while the westbound entrance and exit ramps operate at LOS E and LOS F respectively during the weekday morning peak hour. The short-term and long-term recommendations at this interchange area are listed in Table ES-4.

Table ES-4
Summary of Interchange 16 Recommendations

Project	Type	Preliminary Cost Estimate	Comments
Short-Term			
➢ Provide signal coordination and additional lanes to improve traffic operations at the intersection of Old Waterbury Road and Route 188. ➢ Provide signal coordination and additional lanes to provide more storage and improve traffic operations at intersection of I-84 WB exit ramp and Route 188.	TSM - Intersection	$580,000	
➢ Provide additional acceleration length for I-84 WB entrance ramp	Interstate Ramp	N/A	This deficiency will be addressed by DOT Safety Improvement Project No. 130-169
➢ Install a new I-84 directional sign along Old Waterbury Road	TSM - Signage	$500	
➢ Install new route signage on I-84 WB exit ramp	TSM - Signage	$500	
➢ Straighten the I-84 EB entrance ramp sign	TSM - Signage	N/A	Notify ConnDOT Maintenance
Long-Term			
➢ Provide 1500 feet of acceleration length for I-84 WB entrance ramp	Interstate Ramp	N/A	Will be completed as part of Interstate reconstruction
➢ Provide 600 feet of deceleration length for I-84 EB exit ramp	Interstate Ramp	N/A	Will be completed as part of Interstate reconstruction
➢ Provide additional General Purpose Lane along I-84 EB	Interstate Mainline	N/A	Costs are broken out by contract (see Table 5.9)
➢ Provide additional General Purpose Lane along I-84 WB	Interstate Mainline	N/A	Costs are broken out by contract (see Table 5.9)
➢ Investigate the potential for truck rest areas – include shoulders on truck climbing lanes	TDM - Truck / TSM - Safety	N/A	

NA – Not Applicable – will be completed by ConnDOT

The recommendation for the intersection of Old Waterbury Road and Route 188 requires the provision of an exclusive right turn lane in the eastbound direction along Old Waterbury Road,

an exclusive left turn lane in the northbound direction, and an additional through lane in the southbound direction along Route 188. The intersection of I-84 WB Ramp and Route 188 will require additional left turn and through lanes in the northbound direction and an exclusive right turn lane in the southbound direction along Route 188 to accommodate future year traffic volume.

As a short-term solution, the two intersections should be widened as TSM improvements. In addition to the widening, the two signals should be coordinated to reduce queuing between intersections. Based on field surveys, widening along Route 188 seems achievable along the east side of the intersection due to the existence of wetlands west of the present alignment.

Other short-term improvements include providing highway and roadway signage in the vicinity of the interchange.

As a long-term solution, I-84 in the vicinity of this interchange requires an additional general-purpose lane in each direction to accommodate future year (2025) traffic volumes. In addition, adequate acceleration and deceleration distances will be provided along I-84 in the eastbound and westbound directions during the freeway reconstruction phase of the project. Providing adequate acceleration and deceleration distances will improve the sub-standard radii at the I-84 eastbound interchange**.** The need to investigate providing truck rest areas was also identified.

Interchange 17

Interchange 17 possesses some of the poorest operational conditions in the WOW corridor. Due to the physical layout of the interchange, the eastbound entrance and exit ramps are accessed from Route 64 while the westbound entrance and exit ramps are accessed via Route 63. This split interchange configuration creates heavy congestion at the intersection of these two routes. In the future year 2025, the eastbound entrance and exit ramps from Route 63/Route 64 operate at LOS F during the weekday evening peak hour, while the westbound entrance and exit ramps from Route 63/Route 64 operate at LOS F during the weekday morning peak hour. In addition, the westbound off-ramp to Route 64 operates at LOS F during the weekday evening peak hour. The short-term and long-term recommendations at this interchange area are listed in Table ES-5.

Table ES-5
Summary of Interchange 17 Recommendations

Project	Type	Preliminary Cost Estimate	Comments
Short-Term			
➢ Build a Connector Road between Route 64 and Route 63 along existing ROW to provide operational improvement	Arterial Road	$3,130,000	Develop along existing rail ROW
➢ Build a multi-use path along new Connector Road to provide bike/ped access between Middlebury and Waterbury	TDM – Bicycle/ Pedestrian	$210,000	
➢ Signalize the intersection of Chase Parkway/I-84 WB exit ramp/Connector Road and extend the exit ramp deceleration length an additional 525 feet	TSM – Intersection / Interstate Ramp	$1,240,000	Developing a tighter curve on WB exit ramp may help slow vehicles before the new signal
➢ Provide adequate signage to warn drivers of the end of truck-climbing lane on I-84 EB	TSM - Signage	$2,200	
➢ Provide Park and Ride Lot sign on Interstate	TSM - Signage	$2,200	
➢ Provide signage leading commuters to alternate Park and Ride lot at Maggie McFly's on Route 63	TDM – Parking / Signage	$2,000	Main lot at 100% utilization
➢ Replace the 'East' auxiliary sign mounting on I-84 Route marker	TSM - Signage	$100	Notify ConnDOT Maintenance
➢ Install a directional sign on Route 64 indicating Chase Parkway intersection	TSM - Signage	$600	
➢ Repair the bent sign on the I-84 EB entrance ramp	TSM - Signage	$100	Notify ConnDOT Maintenance
Long-Term			
➢ Provide 900 feet of acceleration length on I-84 WB entrance ramp	Interstate Ramp	N/A	Will be completed as part of Interstate reconstruction
➢ Widen the Route 63/64 intersection and provide additional lanes to accommodate future traffic volumes	TSM - Intersection	$1,050,000	May have property impacts
➢ Re-grade Route 64 to eliminate crest vertical curve and poor sight distance. ➢ Widen Route 64 (in conjunction with re-grade) to accommodate four lane cross section	Arterial Road	$2,150,000	Should not impact existing utilities. Should be done in conjunction with intersection improvements
➢ Provide additional General Purpose Lane along I-84 EB	Interstate Mainline	N/A	Costs are broken out by contract (see Table 5.9)
➢ Provide additional General Purpose Lane along I-84 WB	Interstate Mainline	N/A	Costs are broken out by contract (see Table 5.9)

NA – Not Applicable – will be completed by ConnDOT

The recommendations at this interchange would require a significant investment to complete. The biggest traffic operational concern is the intersection of Route 63 and Route 64. As a short-term improvement, a Connector Road constructed from Route 63 to Route 64 along existing rail ROW could provide relief to congestion at the intersection and also improve operations along Route 63 and Route 64. As traffic volumes in the corridor increase, the intersection would

require additional widening to operate efficiently. Other short-term improvements would include providing adequate highway and roadway signage at this interchange.

A recommended long-term improvement involves widening the intersection of Route 63 and Route 64 to handle the increasing level of traffic. Route 64 is recommended to be widened to four lanes and re-graded to reduce the crest vertical curve that is contributing to poor sight distance approaching the intersection from the east. In addition, the provision of a general-purpose lane through this interchange and increasing acceleration distances in the eastbound direction will be part of a freeway reconstruction phase at this location.

Interchange 18

Interchange 18 has two mainline lanes and single lane entrance and exit ramps along I-84 in the eastbound and westbound directions; however, in the westbound direction I-84 includes a truck-climbing lane at the Highland Avenue off ramp junction. Under the future year 2025, all freeway ramp junctions operate at LOS E or worse during the weekday morning and evening peak hours. The short-term and long-term recommendations at this interchange area are listed in Table ES-6.

Table ES-6
Summary of Interchange 18 Recommendations

Project	Type	Preliminary Cost Estimate	Comments
Short-Term			
➢ Build a Connector Road between Highland Avenue and W. Main Street to provide better connectivity. ➢ Reconstruct I-84 WB exit ramp to a standard 275 foot radius – install signal to intersection of ramp with connector road	Arterial Road / Interstate Ramp	$3,880,000	
➢ Widen the bridge over I-84 to provide an additional left turn lanes to Chase Parkway	Structural	$710,000	Structure needs to be widened as part of the additional lane improvement (cost included in add-a-lane)
➢ Provide overhead Route 8 directional signs on I-84 EB to reduce driver confusion	TSM - Signage	$100,000	
➢ Install a new I-84 directional sign on W. Main Street	TSM - Signage	$500	
➢ Install a new I-84 directional sign on Country Club Road	TSM - Signage	$500	
➢ Replace the deteriorated sign along Chase Parkway	TSM - Signage	$500	Notify ConnDOT Maintenance
➢ Provide adequate I-84 route signage along Chase Parkway to reduce driver confusion	TSM - Signage	$1,000	
➢ Move I-84 route sign away from fence on Highland Avenue to improve visibility	TSM - Signage	N/A	Notify ConnDOT Maintenance
Long-Term			
➢ Provide 500 feet of acceleration length to I-84 EB entrance ramp	Interstate Ramp	N/A	Will be completed as part of Interstate reconstruction
➢ Provide 500 feet of deceleration length to I-84 EB and WB exit ramps	Interstate Ramp	N/A	Will be completed as part of Interstate reconstruction
➢ Reconstruct I-84 EB to include an additional General Purpose Lane – lane will drop before entrance ramp but full pavement width will extend to Route 8 northbound entrance ramp	Interstate Mainline	N/A	Costs are broken out by contract (see Table 5.9)
➢ Provide additional General Purpose Lane along I-84 WB	Interstate Mainline	N/A	Costs are broken out by contract (see Table 5.9)

NA – Not Applicable – will be completed by ConnDOT

Like Interchange 17, Interchange 18 presents numerous operational and safety deficiencies while being constrained by the physical limits of the transportation infrastructure. While not all of the deficiencies can be addressed as part of this study, some improvement can be made to relieve the traffic pressure that is building in this area.

This interchange will require primarily traffic operations related improvements. The bridge over I-84 along Chase Parkway is recommended to be widened to provide six lanes to solve the

operational problems between West Main Street and Country Club Road. This widening could be pursued as a short-term improvement and would require bridge reconstruction.

The sub-standard curve radius at the I-84 WB Exit Ramp to Highland Avenue/W. Main Street could also be pursued as a short-term improvement. The realigned ramp would intersect with a newly constructed Connector Road between W. Main Street and Highland Avenue. Other improvements at this interchange are related to highway and roadway signage and will be pursued as short-term improvements.

The long-term improvement at this interchange is providing an additional I-84 general-purpose lane in each direction and providing adequate acceleration and deceleration distances in both directions during the freeway reconstruction phase. A key to the highway operations at this interchange is its connectivity to the Route 8 Interchange and will be investigated further when the Route 8 Interchange is evaluated in a separate concentrated future study.

Additional Recommendations

Interchanges 19, 20, and 21 constitute the series of ramps and interconnections that make up the 'Mixmaster' I-84/Route 8 Interchange structure in Downtown Waterbury. The bridge structures for the eastbound and westbound viaducts are stacked vertically, rather than in a more conventional arrangement where the opposing roadways are parallel to each other. This section of I-84 experiences numerous operational, structural, and safety deficiencies. Some of these are as follows:

- Left hand exit from I-84 eastbound to Route 8 northbound;
- Left hand entrance to I-84 eastbound from Route 8 southbound;
- Left hand entrance to I-84 westbound from Route 8 northbound;
- Left hand entrance to I-84 westbound from Bank Street;
- Substandard weave section between I-84 eastbound entrance from Route 8 south to Meadow Street Exit ramp;
- Substandard weave section between I-84 westbound entrance from Route 8 north to Highland Street Exit ramp;
- High accident location I-84 at Route 8, Meadow Street Interchange (Interchange 21);
- Two lane stretch of I-84 eastbound between exit to Route 8 northbound and entrance from Route 8 southbound; and
- Poor structural rating on main span over Naugatuck River (will be upgraded by ConnDOT).

While identifying these deficiencies, it became apparent that this interchange area would require a detailed analysis that is beyond the scope of this study. The level of complexity that this interchange area exhibits requires a focused effort that considers not only traffic operation, but structural analysis, maintenance and protection of traffic, environmental and social mitigation, property impacts, and a robust public involvement program. It is the recommendation of this study to conduct a follow-on study that will consider each of these elements in greater detail. For the purpose of this discussion, this future study will be referred to as the Waterbury Access Study.

In addition, inadequate Wayfinding (Tourism) and Directional signage has been identified as a deficiency in this study. While the intent of this study was not to develop a detailed signage plan or design the layout of special signage, it did take a conceptual look at the routing of traffic to and from I-84. It is the further recommendation of this study to develop a detailed signage plan for Downtown Waterbury. This may be a component of a Waterbury Access Study or a stand-alone investigation.

The recommended actions for the remainder of the corridor are listed in Table ES-7.

Table ES-7
Summary of Additional Recommendations

Project	Type	Preliminary Cost Estimate	Comments
Short-Term			
➢ Include Downtown Waterbury directional signage to Interstate and other destinations	Study	$10,000	Preliminary Cost - will need to study in greater detail to determine types and locations of signage
➢ Perform a study to evaluate the I-84/Route 8 interchange area	Study	TBN	This area will remain a 'choke point' in the interstate system until a solution is identified and pursued

TBN – To Be Negotiated
NA – Not Applicable – will be completed by ConnDOT

Next Steps

The recommendations from this study will need to satisfy state and federal approval and permitting requirements before they can be further developed and constructed. In order to receive federal funding for a highway project, ConnDOT and COGCNV must demonstrate to Federal Highway Administration (FHWA) that they have considered the environmental impacts of each proposed improvement that is being pursued. To accomplish this, a study must be performed in accordance with the National Environmental Policy Act (NEPA) as well as the Connecticut Environmental Policy Act (CEPA) to determine the level of impact to environmental resources. This study can take one of three forms:

- An Environmental Impact Statement (EIS), which is required for major projects anticipated to have extensive environmental impacts;
- An Environmental Assessment (EA), which is required for projects in which the environmental impacts are uncertain – which can lead to an EIS if impacts are determined to be significant; and
- A Categorical Exclusion (CE), which is required for minor projects that do not have any significant environmental impact.

If wetlands are to be impacted as a result of any of the proposed improvements, the U.S. Army Corps of Engineers (ACOE) requires a Section 404 (of the Clean Water Act) Permit. To apply for this permit, the project must seek to 1) avoid, 2) minimize, or 3) mitigate wetland impacts.

ACOE will review the environmental documents prepared under the NEPA process and decide on the level of the permitting that is required for the project.

Other permits that may be required by Connecticut Department of Environmental Protection (DEP) and U.S. Environmental Protection Agency (EPA) include:

- Connecticut Flood Management Certification;
- Connecticut Inland Wetlands and Watercourses Act Permit;
- Connecticut Indirect Source Permit; and
- National Pollutant Discharge Elimination System.

In addition to the environmental regulations that must be satisfied, FHWA will need to approve any alternative that requires a change in access on the Interstate. This includes ramps that have been relocated or modified to diverge or merge at a new location. Improvements at Interchanges 17 and 18 will need to be evaluated based on safety, design standards, and consistency with surrounding land uses.